We claim:

1. A system for illuminating a target surface, the system comprising:

a light source, positioned at an angle relative to a circuit board, the light source emitting light through an opening in the circuit board; and

a lens having an entrance surface and an exit surface, the entrance surface positioned to gather the light from the light source and the exit surface directing the light onto the target surface.

2. The system of claim 1, wherein the lens directs the light onto the target surface using refraction.

3. The system of claim 1, wherein the lens directs the light onto the target surface using a Fresnel lens.

4. The system of claim 1, wherein the lens directs the light onto the target surface using a diffractive optical element.

5. The system of claim 1, wherein the angle between the light source and the circuit board is approximately an angle between 10 degrees and 45 degrees.

6. The system of claim 1, wherein the light emitted from the light source flows through an opening in the circuit board.

7. The system of claim 1, wherein the light source protrudes through the circuit board.

8. The system of claim 1, wherein the lens is wedge-shaped.

9. The system of claim 1, the entrance surface further comprises a curvatured surface for gathering light emitted from the light source.

10. The system of claim 9, wherein the curvatured entrance surface is aspherical in shape.

11. The system of claim 1, wherein the exit surface further comprises a curvatured surface for spreading light emitted from the light source onto the target surface.

12. The system of claim 11, wherein the curvatured exit surface is toroidal in shape.

13. The system of claim 1, wherein the system is for use in an optical mouse.

14. The system of claim 1, wherein the system is for use in an optical trackball.

15. The system of claim 1, wherein the light source is a light emitting diode.

16. The system of claim 1, wherein the lens is made from glass.

17. The system of claim 1, wherein the lens is made from an optical plastic.

18. A method of manufacturing an efficient illumination system for illuminating a surface, the method comprising:

placing a light source at an angle relative to the surface, the light source for emitting light; and

positioning a refractive lens, the refractive lens gathering light from the light source and directing the light directly to the surface.

19. The method of claim 18, wherein the light source emits light through an opening in a circuit board.

20. The method of claim 18, wherein the light source is a light emitting diode.

21. The method of claim 18, wherein the angle between the light and the surface is approximately an angle between 10 degrees and 45 degrees.

22. The method of claim 18, further comprising placing the illumination system in an optical mouse.

23. The method of claim 18, wherein the refractive lens is composed of glass.

24. The method of claim 18, wherein the refractive lens is composed of an optical plastic.

25. A method for illuminating a surface comprising:

emitting light at an angle relative to the surface and emitting light through a circuit board;

gathering the light; and

directing the light directly onto the surface using a refractive lens.

26. The method of claim 25, wherein the angle relative to the surface is approximately between 10 degrees and 45 degrees.

27. A system for illuminating a surface, the system comprising:

a light emitting means for emitting light, the light emitting means tilted relative to the surface;

a gathering means for gathering the light; and

a directing means for directing the light directly onto the surface.

28. The system of claim 27, wherein the light emitting means is a light emitting diode.

29. The system of claim 27, wherein the light emitting means is tilted at an angle of approximately 10 degrees to 45 degrees.

30. The system of claim 27, wherein the gathering means is a lens positioned to gather the light from the light emitting means.

31. The system of claim 27, wherein the illumination system is housed in an optical mouse.

32. A refractive lens comprising:

a first curvatured surface, positioned to gather light; and

a second curvatured surface, coupled to the first surface, shaped for directing the light in an optical illumination system directly to a target surface using refraction.

33. The refractive lens of claim 32, wherein the first surface is aspherical in shape.

34. The refractive lens of claim 32, wherein the second surface is toroidal.

35. The refractive lens of claim 32, further comprising a light source for illuminating the first surface and the second surface.

36. The refractive lens of claim 32, wherein the refractive lens is used in an optical mouse.

37. The refractive lens of claim 32, wherein the refractive lens is used in an optical trackball.

38. The refractive lens of claim 32, wherein the lens is composed of glass.

39. The refractive lens of claim 32, wherein the lens is composed of an optical plastic.

40. An illumination system, using total internal reflection, comprising:

an entrance surface, positioned to gather light;

a truncated light pipe, coupled to the entrance surface, for directing the light; and

a curvatured exit surface, coupled to the light pipe, for efficiently directing the light onto a surface.

41. The system of claim 40, wherein a section of the light pipe is cone-shaped.

42. The system of claim 41, wherein the cone-shaped light pipe has a larger entrance cross-section than an exit cross-section.

43. The system of claim 40, wherein a section of the truncated light pipe is cylindrically shaped.

44. The system of claim 40, wherein the truncated light pipe further comprises a first reflective surface for truncating the light pipe.

45. The system of claim 44, wherein the first reflective surface has a metal coating.

46. The system of claim 44, wherein the first reflective surface is positioned such a total internal reflection condition is satisfied.

47. The system of claim 40, further comprising a second reflective surface for further directing the light toward the exit surface.

48. The system of claim 47, wherein the second reflective surface has a metal coating.

49. The system of claim 47, wherein the first reflective surface is positioned such a total internal reflection condition is satisfied.

50. The system of claim 40, further comprising a light source for emitting light.

51. The system of claim 47, wherein the light source is a light emitting diode.

52. The system of claim 40, wherein the truncated light pipe is made from an optical plastic.

53. The system of claim 40, wherein the truncated light pipe is made from glass.

54. An illumination method comprising:

gathering light;

directing the light onto a surface using total internal reflection with a light pipe.

55. The illumination method of claim 54, wherein the light pipe is cone-shaped.

56. The illumination method of claim 54, further comprising focusing the light onto the surface using a toroidal exit surface.

57. An illumination system for use in a displacement detection computer pointing device, the system comprising:

a circuit board;

a light emitting diode at a first angle relative to the circuit board; and

a lens aligned with the light emitting diode for focusing the light at a second angle onto a surface, the lens comprising an aspherical entrance surface and a cylindrical exit surface.